REMARKS

Claims 1-25 remain pending in the present application. Applicants greatly appreciate the thorough review of the present application, the allowance of claims 12 and 21 and the indication of allowable subject matter in dependent claims 15 and 16. Accordingly, reconsideration and allowance for all of the claims in the present application are earnestly solicited in view of the following amendments and remarks.

Claims 1-5, 8-11, 13, 14, 17-20 and 22-25 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,339,691 to Morimiya et al. This rejection is respectfully traversed.

The amended claims of the present application are directed to an indirectly heated cathode and a support rod in which discharge is generated therebetween. Additionally, the claims of the present application are directed to avoiding high pressure near the support rods and preventing gas introduction around the support electrode as disclosed in the present specification. Specifically, claims 1 and 25 of the present application recite cathode sub-assemblies comprising an indirectly heated cathode and a support rod fixedly attached thereto and press fitted thereto respectively. Claims 9 and 13 recite cathode assemblies for use in an indirectly heated cathode ion source comprising a cathode sub-assembly, a filament and a cathode insulator wherein claim 13 recites the specifics of an opening in the cathode insulator. Claim 18 recites a cathode assembly for an ion source comprising a cathode, a support rod, a cathode insulator and an indirect heating source. Claim 17 recites a method for supporting and indirectly heating a cathode of an ion source. Each of these claims is directed to indirectly heated cathode ion sources which include a relatively massive cathode heated by electron bombardment from a filament for emitting electrons thermionically. The filament is isolated from the plasma in the arc chamber so that a long lifetime is provided. The cathode in the indirectly heated cathode ion source must be electrically isolated from its surroundings, electrically connected to a power supply and thermally isolated from its surroundings to inhibit cooling which would cause it to stop emitting electrons. The indirectly heated cathode recited in the claims of the present application is electrically and thermally isolated from its surroundings to promote emission of electrons from the ion source.

Morimiya et al. is relied upon to disclose an arc discharge apparatus having a hollow cathode. As illustrated in Fig. 5, an arc discharge apparatus having a hollow cathode 2 includes an electron emitter layer 47 provided on a disk electrode 46 and a stem 45. However, Morimiya

et al. does not disclose a cathode sub-assembly for an ion source comprising an indirectly heated cathode (47) and a support rod (45 and 46) fixedly attached to the indirectly heated cathode (47) for supporting the cathode within an arc chamber (2) of the ion source (element numbers refer to figure 5 and col. 4, lines 1-60 of Morimiya et al). Element 2 of Morimiya et al. is actually the cathode and not the arc chamber. The cathode of Morimiya et al. is neither disk shaped nor supported by a rod as recited in the claims of the present application. Morimiya et al. also refers to elements 46 and 47 as disk shaped electrodes in which there is never a discharge between elements 2 (the cathode) and elements 46/47 (electrodes). In contrast, a discharge is generated between the cathode and the support rod in the present invention which is the mechanism defining indirect heating. Furthermore, Moriyima et al. deliberately arranges for high pressure near the electrodes 46/47 and introduces gas surrounding the support electrode. The method and apparatus recited in the claims of the present application are directed to avoiding high pressure, especially near the support rods and preventing gas from surrounding the support electrode. Therefore, the apparatus disclosed by Morimiya et al. does not include an indirectly heated cathode because Morimiya et al. utilize a hollow cathode 2 with a disk electrode 46 positioned therein. Because Morimiya et al. do not disclose an indirectly heated cathode as recited in the claims of the present application, it is respectfully submitted that claims 1-5, 8-11, 13, 14, 17-20 and 22-25 of the present application patentably define over Morimiya et al.

Claims 6 and 7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Morimiya et al. in view of U.S. Patent No. 4,783,595 to Seidl. This rejection is respectfully traversed.

Dependent claim 6 recited the specifics of the diameter of the cathode and dependent claim 7 recites that the cathode sub-assembly further comprises a spring loaded clamp for holding the support rod. Seidl is relied upon to disclose a compression-assembly spring 7 which urges against a piston 6 in a solid state ion source 100 as illustrated in Figure 1. However, Seidl fails to suggest or imply an indirectly heated cathode and therefore fails to cure the deficiencies of Morimiya et al. Furthermore, Seidl fails to suggest or imply a spring loaded clamp for holding a support rod for an indirectly heated cathode. Seidl is directed to a spring 7 for urging against a piston 6 which is fundamentally different than a loaded clamp for a support rod for an indirectly heated cathode.

With respect to dependent claim 6 of the present application, it is further alleged that it would have been obvious to one having ordinary skill in the art to adjust the diameter of the

support rod in accordance to the cathode. It is respectfully submitted that the diameter of the cathode as recited in claim 6 would not have been obvious to one having ordinary skill in the art and that support for this assertion be provided if this rejection is maintained. The specific diameter recited in claim 6 is just one example of the dimensions for the cathode as recited in the paragraph bridging pages 10 and 11 of the present application. Accordingly, it is respectfully submitted that claims 6 and 7 patentably define over the combination of Morimiya et al. and Seidl and it is respectfully requested that this rejection be reconsidered and withdrawn.

For all of the above stated reasons, it is respectfully submitted that all of the outstanding objections and rejections have been overcome. Therefore, it is requested that claims 1-11, 13-20 and 22-25 of the present application be passed to issue along with allowed claims 12 and 21.

If any issues remain unresolved, the Examiner is requested to telephone the undersigned attorney.

Please charge any additional fees or credit any overpayments to deposit account No. 50-0896.

Respectfully submitted,
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